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U.S. Army Toxic and Hazardous Materials Agency

AD-A216 072

Enhanced Preliminary Assessment Report:

Orange Army Housing Units Orange, Connecticut

October 1989

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prepared for

Commander
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland 21010-5401

prepared by

Environmental Research Division
Argonne National Laboratory
Argonne, Illinois 60439

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SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified		1b. RESTRICTIVE MARKINGS	
2a. SECURITY CLASSIFICATION AUTHORITY		3 DISTRIBUTION/AVAILABILITY OF REPORT Distribution Unlimited	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE			
4. PERFORMING ORGANIZATION REPORT NUMBER(S)		5. MONITORING ORGANIZATION REPORT NUMBER(S) CETHA-BC-CR-89013	
6a. NAME OF PERFORMING ORGANIZATION Environmental Research Div. Argonne National Laboratory	6b. OFFICE SYMBOL (If applicable) ERD	7a. NAME OF MONITORING ORGANIZATION U.S. Army Toxic & Hazardous Matls. Agency	
6c. ADDRESS (City, State, and ZIP Code) Building 203 9700 South Cass Avenue Argonne, IL 60439		7b. ADDRESS (City, State, and ZIP Code) Attn: CETHA-BC Aberdeen Proving Ground, MD 21010-5401	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION U.S. Army Toxic & Hazardous Materials Agency	8b. OFFICE SYMBOL (If applicable) CETHA-BC	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER U.S. Department of Energy Contract W-31-109-ENG-38	
8c. ADDRESS (City, State, and ZIP Code) U.S. Army Toxic & Hazardous Materials Agency Attn: CETHA-BC Aberdeen Proving Ground, MD 21010-5401		10. SOURCE OF FUNDING NUMBERS	
11. TITLE (Include Security Classification) Enhanced Preliminary Assessment Report: Orange Army Housing Units Orange, CT		PROGRAM ELEMENT NO.	PROJECT NO.
12. PERSONAL AUTHOR(S)		TASK NO.	WORK UNIT ACCESSION NO.
13a. TYPE OF REPORT Final	13b. TIME COVERED FROM _____ TO _____	14. DATE OF REPORT (Year, Month, Day) October, 1989	
15. PAGE COUNT <u>32</u>			
16. SUPPLEMENTARY NOTATION			
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP		
19. ABSTRACT (Continue on reverse if necessary and identify by block number)			
<p>Argonne National Laboratory has conducted an enhanced preliminary assessment of the Army housing property located in Orange, CT. The objectives of this assessment include identifying and characterizing all environmentally significant operations, identifying areas of environmental contamination that may require immediate remedial actions, identifying other actions which may be necessary to resolve all identified environmental problems, and identifying other environmental concerns that may present impediments to the expeditious sale of this property.</p>			
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a. NAME OF RESPONSIBLE INDIVIDUAL Joseph A. Ricci, Project Officer		22b. TELEPHONE (Include Area Code) (301)671-3461	22c. OFFICE SYMBOL CETHA-BC

DD FORM 1473, 84 MAR

23 APP Edition may be used until exhausted.

All other editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE

UNCLASSIFIED

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SUMMARY

The Orange military housing facility located in Orange, Conn., presents no imminent or substantial threat to human health or the environment. There is no evidence to suggest that hazardous or toxic constituents have ever been released from this property. No immediate remedial actions, therefore, are warranted for the site.

Although these housing units were originally developed in conjunction with a Nike missile battery, available documentation and circumstantial evidence indicate that the housing property was wholly independent of the battery's operational activities. No Nike-related wastes were delivered to this property for management or disposal. Furthermore, since this property was independent of the Nike missile operations with respect to all necessary utilities, there is no possibility of migration of Nike-related wastes along buried utility lines. Nevertheless, three potential environmental impacts from this property that require actions have been identified.

One environmental concern involves the putatively substandard waste-disposal systems that service each housing unit. There may ultimately be an adverse affect on the environment if these on-site subsurface sewage systems remain in service without being brought up to State of Connecticut waste-disposal standards. A second concern involves the fuel-oil storage tanks. The exteriors of the new above-ground tanks appear not to have an adequate protective coating, and some of them were observed to have areas of rust. An adverse environmental impact can be anticipated should these tanks remain in service in their present condition. Adding to this concern is the possibility that the effectiveness of the concrete containment box beneath each tank would be compromised if the drainage tap on the box were to remain in the open position for an extended period of time.

A third concern involves the presence and condition of asbestos insulation on water pipes in the utility rooms of the units.

The following actions are recommended prior to the release of this property:

- Bring the waste-disposal systems up to state standards.
- Assure the integrity of the fuel-oil storage tanks, treat for rust, and apply a proper protective coating.
- Develop and implement a solution to the possibility of containment-box drainage taps being inadvertently left in the open position.
- Remediate deteriorated asbestos-containing insulation materials present in the units.

The above recommendations are based on the assumption that this property will continue to be used for residential housing.

1 INTRODUCTION

In October 1988, Congress passed the Defense Authorization Amendments and Base Closure and Realignment Act, Public Law 100-526. This legislation provided the framework for making decisions about military base closures and realignments. The overall objective of the legislation is to close and realign bases so as to maximize savings without impairing the Army's overall military mission. In December 1988, the Defense Secretary's ad hoc Commission on Base Realignment and Closure issued its final report nominating candidate installations. The Commission's recommendations, subsequently approved by Congress, affect 111 Army installations, of which 81 are to be closed. Among the affected installations are 53 military housing areas, including the Orange housing area addressed in this preliminary assessment.¹

Legislative directives require that all base closures and realignments be performed in accordance with applicable provisions of the National Environmental Policy Act (NEPA). As a result, NEPA documentation is being prepared for all properties scheduled to be closed or realigned. The newly formed Base Closure Division of the U.S. Army Toxic and Hazardous Materials Agency is responsible for supervising the preliminary assessment effort for all affected properties. These USATHAMA assessments will subsequently be incorporated into the NEPA documentation being prepared for the properties.

This document is a report of the enhanced preliminary assessment (PA) conducted by Argonne National Laboratory (ANL) at the Army stand-alone housing area in Orange, Conn.

1.1 AUTHORITY FOR THE PA

The USATHAMA has engaged ANL to support the Base Closure Program by assessing the environmental quality of the installations proposed for closure or realignment. Preliminary assessments are being conducted under the authority of the Defense Department's Installation Restoration Program (IRP); the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 91-510, also known as Superfund; the Superfund Amendments and Reauthorization Act of 1986, Public Law 99-499; and the Defense Authorization Amendments and Base Closure and Realignment Act of 1988, Public Law 100-526.

In conducting preliminary assessments, ANL has followed the methodologies and procedures outlined in Phase I of the IRP. Consequently, this PA addresses all documented or suspected incidents of actual or potential release of hazardous or toxic constituents to the environment.

In addition, this PA is "enhanced" to cover topics not normally addressed in a Phase I preliminary assessment. Specifically, this assessment considers and evaluates the following topical areas and issues:

- Status with respect to regulatory compliance,
- Asbestos,
- Polychlorinated biphenyls (PCBs),
- Radon hazards (to be assessed and reported on independently),
- Underground storage tanks,
- Current or potential restraints on facility utilization,
- Environmental issues requiring resolution,
- Health-risk perspectives associated with residential land use, and
- Other environmental concerns that might present impediments to the expeditious "excessing," or transfer and/or release, of federally owned property.

1.2 OBJECTIVES

This enhanced PA is based on existing information from Army housing records of initial property acquisition, initial construction, and major renovations and remodeling performed by local contractors or by the Army Corps of Engineers. The PA effort does not include the generation of new data. The objectives of the PA include:

- Identifying and characterizing all environmentally significant operations (ESOs),
- Identifying property areas or ESOs that may require a site investigation,
- Identifying ESOs or areas of environmental contamination that may require immediate remedial action,
- Identifying other actions that may be necessary to address and resolve all identified environmental problems, and
- Identifying other environmental concerns that may present impediments to the expeditious transfer of this property.

1.3 PROCEDURES

Connecticut military housing records located at Fort Devens, Mass., were reviewed during the week of May 15-19, 1989. Additional information was obtained on July 17, 1989, from the Family Housing Office located at the Navy and Marine Corps Reserve Center, New Haven, Conn., and from an interview on July 20, 1989, with the Area Facilities Engineer at his office in Windsor Locks, Conn. A site visit was conducted at Orange, Conn., on July 17, 1989, at which time additional information was obtained through personal observations of ANL investigators and discussions with the site's senior occupant. Photographs were taken of the housing units and surrounding properties as a means of documenting the condition of the housing units and immediate land uses. Site photographs are appended.

All available information was evaluated with respect to actual or potential releases to air, soil, and surface and ground waters.

Access to individual housing units was obtained through the senior occupant at the facility. In addition, ANL investigators revisited the property on September 8, 1989, at which time the interiors of all but two of the houses (units #340 and 354, Sybil Street) were inspected.

2 PROPERTY CHARACTERIZATION

2.1 GENERAL PROPERTY INFORMATION

The Orange family housing facility contains 7.57 acres of land in fee and 1.7 acres in easements.² It is located in the town of Orange in New Haven County in southwestern Connecticut. Figures 1 and 2 show the general location of the facility.

The housing units were developed in 1958 and were recently renovated.^{3,4} No additional major construction has taken place on the property since it was developed.

2.2 DESCRIPTION OF FACILITY

Figure 3 shows the site plan of the housing property.

Housing Units

The Orange military housing facility comprises 20 wood-frame, one-story, single-family houses built on concrete slabs. Capehart is the model name assigned to these houses by the builder, National Homes. Ten of the units have two bedrooms and ten have three bedrooms.^{3,4}

Utilities

Since development of the property, the housing units have been connected to the town water department's distribution system, and no drinking water wells exist on the property. Likewise, the electrical distribution system for the property is connected to the local power company's distribution system. However, according to the Area Facilities Engineer, all water and electrical lines, utility poles, and electrical transformers on the property are owned by the U.S. Government, which is responsible for maintaining them. Therefore, the cost of repairs made to the property's utility distribution systems by public utility personnel is borne by the government. There is no documentation of testing of the electrical transformers for the presence of PCBs. No evidence of spills or leaks from the transformers was found. Solid wastes are removed from the property by a private contractor.

Sewage

Each of the 20 housing units has its own subsurface sewage disposal system, consisting of a 750-gallon septic tank, a concrete distribution box, and either a leaching well (3 units) or leaching trenches (17 units).⁴

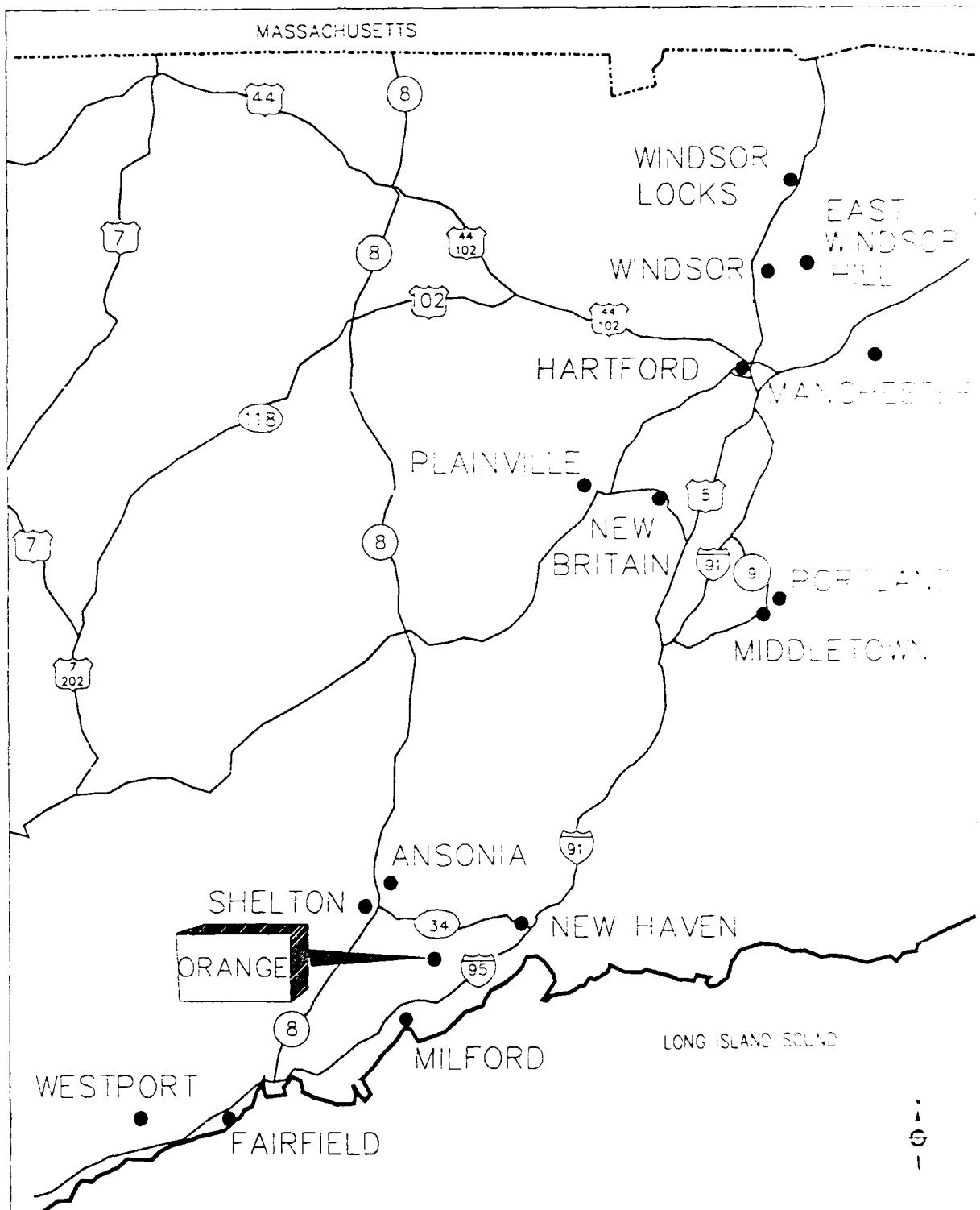


FIGURE 1 Location Map of Connecticut Army Housing Facilities

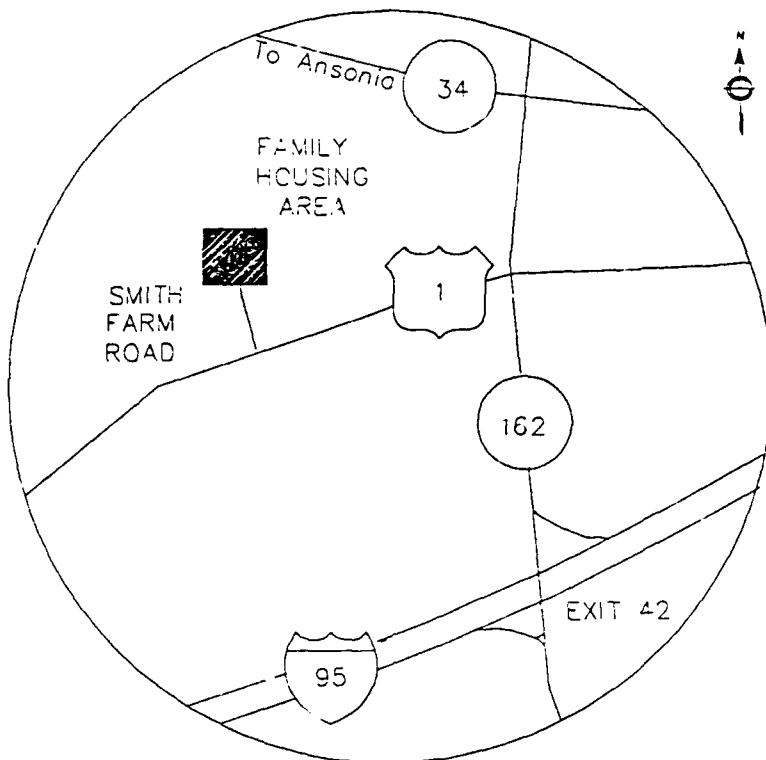


FIGURE 2 Vicinity Map of Orange Army Housing Units

Fuel Storage

Each unit has an above-ground, 275-gallon, fuel-oil storage tank located in the rear of the unit. New concrete containment boxes are in place beneath the recently installed tanks. The containment boxes are at ground level above the old original underground storage tanks. The underground tanks were drained of oil, filled with sand or fine gravel, and left in place. This tank replacement was contracted through the New York District Army Corps of Engineers approximately two years ago. There is no documentation or suspicion of releases of petroleum contamination from these tanks. Because of their advancing ages, however, they were replaced as a matter of good engineering practice.

Storm Drainage Systems

The property is drained by surface runoff toward the southeast, through two catch basins located in the southern portion of the property which lead to culverts that cross beneath Sybil Street. The culverts discharge into a brook that runs along the southeast border of the property.⁴

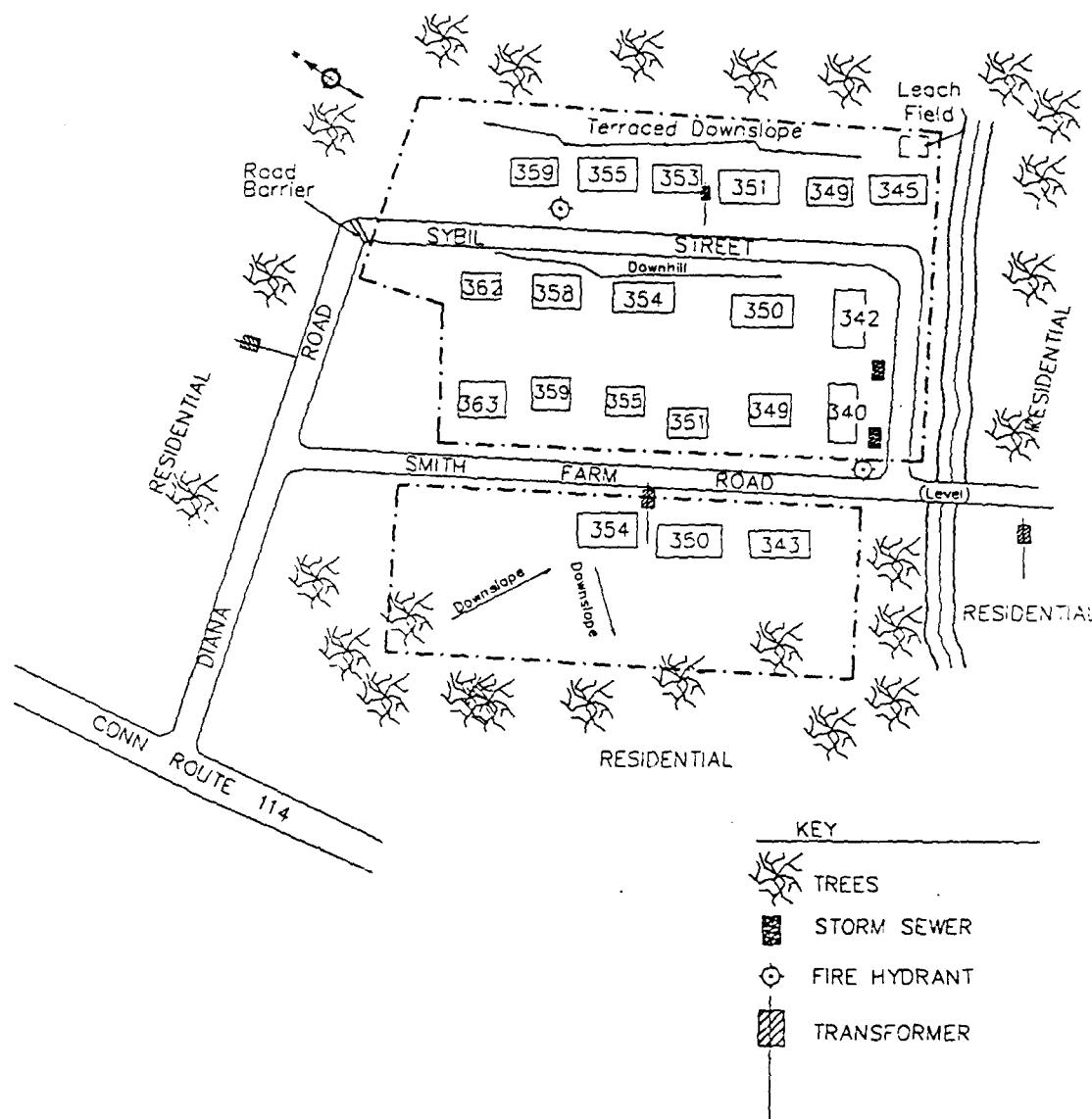


FIGURE 3 Site Plan Map of Orange Army Housing Units

Other Permanent Structures or Property Improvements

Other than recent renovations to the housing units, there are no other permanent structures or property improvements.

2.3 PROPERTY HISTORY

2.3.1 Nike Defense Program and Typical Battery-Level Practices

Generic information on the national Nike antiaircraft defense program has been compiled in two studies, one commissioned by the Army Corps of Engineers⁵ and the

other by the U.S. Army Toxic and Hazardous Materials Agency.⁶ In both studies, independent contractors relied on information contained in unclassified documents related to the Nike surface-to-air missile program, including engineering drawings and specifications (for the facilities and the missiles themselves), interviews with Army personnel participating in the Nike program, and operations manuals and directives relating to the operations and maintenance of Nike facilities. Taken together, these two reports represent the most complete assemblage of generic information on the Nike missile program from an environmental perspective. Salient points from both reports are condensed below.

At its zenith in the early 1960s, the Nike program included 291 batteries located throughout the continental United States. The program was completely phased out by 1976, with many of the properties sold to private concerns or excessed to state or local governments for nominal fees.

Nike Ajax missiles were first deployed in 1954 at installations throughout the continental United States, replacing, or in some cases augmenting, conventional artillery batteries and providing protection from aerial attack for strategic resources and population centers. Typically, Nike batteries were located in rural areas encircling the protected area. The Ajax was a two-stage missile using a solid-fuel booster rocket and a liquid-fuel sustainer motor to deliver a warhead to airborne targets.

The Ajax missile was gradually replaced by the Nike Hercules missile, introduced in 1958. Like the Ajax, the Hercules was a two-stage missile, but it differed from the Ajax in that its second stage was a solid-fuel rather than liquid-fuel power source and its payload often was a nuclear rather than conventional warhead. Ajax-to-Hercules conversions occurred between 1958 and 1961 and required little change in existing Nike battery facilities. A third-generation missile, the Zeus, was phased out during development and consequently was never deployed.

A typical Nike missile battery consisted of two distinct and separate operating units, the launch operations and the integrated fire control (IFC) operations. The two operating areas were separated by distances of less than two miles, with lines of sight between them for communications purposes. A third separate area was also sometimes part of the battery. This area was typically equidistant from the two battery operating sites and contained housing for married personnel assigned to the battery. Occasionally, these housing areas also contained battalion headquarters, which were responsible for a number of Nike batteries.

Depending on area characteristics and convenience, the housing areas were often reliant on the launch or IFC sites for utilities such as potable water, electrical power, and sewage treatment. In those instances, buried utility lines connected the housing area to one or both of the other battery properties. It is also possible, however, that housing areas were completely independent of the missile launcher and tracking operations. In those instances, the necessary utilities were either maintained on the housing site or purchased from the local community. In many localities, as the character of the land area around the housing units changed from rural to suburban or urban, communities extended utility services to the housing unit locations, in which case conversions from independent systems to community systems were made.

A large variety of wastes was associated with the operation and maintenance of Nike missile batteries. Normally encountered wastes included benzene, carbon tetrachloride, chromium and lead (contained in paints and protective coatings), petroleum hydrocarbons, perchloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and trichloroethylene. Because of the rural locations of these batteries, and also because very few regulatory controls existed at that time, most of these wastes were managed "on-site." (Unused rocket propellants and explosives, however, would always have been returned to central supply depots and not disposed of on-site.) It is further conceivable that wastes generated at one of the Nike properties may have been transferred to its companion property for management or disposal.

Wastes related to missile operation and maintenance would not have been purposely transferred from a battery operating area to a housing area with no facilities for waste management or disposal. In some instances, however, the sewage treatment facilities for all Nike battery properties were located at the housing area; that possibility cannot be automatically ignored. Finally, where housing areas received various utilities from either of the operating areas, it is also possible that wastes disposed of on those other properties may have migrated to the housing area via the buried utility lines. And since decommissioning of the Nike batteries did not normally involve removal of buried utility or communication lines, any such contaminant migration is likely to have gone unnoticed.

2.3.2 Orange Housing Units

The Orange housing area was developed in 1958 as a stand-alone housing facility for military personnel assigned to the Nike missile battery located in Orange. The housing facility was completely independent of the battery's launch and fire control operations with respect to water, sewer, and electrical utilities. Twenty single-family houses were erected on the property. Each unit has always been serviced by its own subsurface sewage-disposal system and is supplied with a 15-gallon in-ground garbage container located in the rear of the unit. These garbage containers are no longer in service.

Since the initial property development in 1958, no other permanent structures have been added and none of the original structures has been razed. However, renovations include the installation of smoke and heat detectors in each unit in 1979, and more recently, new vinyl siding installed over the original cedar shakes, new gutters and downspouts, and new above-ground fuel-storage tanks replacing the original underground tanks. In 1988, new heating systems, new windows, and new kitchens and bathrooms were installed. Plans for removal of the in-ground garbage containers are in the design stage.

2.4 ENVIRONMENTAL SETTING AND SURROUNDING LAND USE

There are wooded areas at the eastern and western corners of the housing facility. A southwesterly flowing brook parallels the southeast border of the property. On the opposite side of the brook from the property is an area of private residences. Private residential areas surround the remainder of the facility. The housing units are

constructed on a terraced slope. The town of Orange has an estimated 1986 population of 13,000.⁷

2.5 GEOLOGIC AND HYDROLOGIC SETTINGS

Orange is located in the lower Quinnipiac River Basin of the New England Upland section of the New England Physiographic Province. The Quinnipiac River Basin area in south-central Connecticut covers 362 square miles, and includes all drainage basins that enter Long Island Sound from the Branford to the Wepawaug Rivers. Precipitation averages 47 inches per year and provides an abundant supply of water. Of the total annual precipitation, 21 inches return to the atmosphere as evapotranspiration; the remainder flows directly to streams or percolates to the water table and discharges to Long Island Sound. Small amounts of water are exported from the basin by the New Britain Water Department; small amounts of water are imported to the basin by the New Haven Water Company.

The average annual runoff of 164 billion gallons represents the amount of water potentially available in the area over the long term, but only part of it is presently utilized. Data for 1970 show that only 22% was actually used during that year. Some industries along the Quinnipiac River reuse water; if industrial development continues, reuse will increase.

Stratified drift is the only aquifer capable of large sustained yields of water to individual wells. Yields of 64 screened wells tapping stratified drift range from 17 to 2,000 gallons per minute (gal/min); their median yield is 500 gal/min.⁸

Till is widespread and generally provides only small amounts of water. Wells in till normally yield only a few hundred gallons of water daily and are commonly inadequate during dry periods. Till is generally used only as an emergency or secondary source of water.

Bedrock aquifers underlie the entire report area and include sedimentary, igneous, and metamorphic rock types. These aquifers supply small but reliable quantities of water to wells throughout the basin and are the chief source for many nonurban homes and farms. About 90% of the wells tapping bedrock yield at least 2 gal/min and much larger yields are occasionally reported. Maximum well yields of 305 gal/min for sedimentary, 75 gal/min for igneous, and 200 gal/min for metamorphic bedrock have been reported.

The natural quality of water in the area is good. The water is generally low in dissolved solids and is soft to moderately hard. Surface water is less mineralized than groundwater, especially during high flow when it is primarily surface runoff. Iron and manganese occur in objectionable concentrations in parts of the basin, particularly in water from streams draining swamps and in water from aquifers rich in iron- and manganese-bearing minerals.

Human activities have modified the quality of water in much of the basin. Wide and erratic fluctuations in concentration of dissolved solids in streams, high bacterial

content of the Quinnipiac River, and locally high nitrate and chloride concentrations in groundwater are evidence of man's influence. Streams, wetlands, and some aquifers along the southern boundary of the basin contain salty water. Overpumping has caused extensive saltwater intrusion in aquifers in the southern and eastern parts of New Haven.

The total amount of fresh water used in the area during 1970 is estimated at 35,710 million gallons, or 183 gallons per day per capita. Public water supply systems met the domestic requirements of about 90% of the population; all the systems supplied water that met the drinking water standards of the Connecticut Department of Health.⁹

3 ENVIRONMENTALLY SIGNIFICANT OPERATIONS

3.1 SEPTIC SYSTEM PROBLEMS

According to the Area Facilities Engineer in Windsor Locks, the septic systems are no longer adequate to service the units and do not meet existing State of Connecticut standards. Furthermore, the groundwater table is high, lying just below the surface, and contributes to and exacerbates septic system problems. The unit at 345 Sybil Street is now closed to occupancy because of backup of sewage caused by a leaching-trench plugging problem that persisted despite repeated attempts to correct it.

Similar sewage backup problems have been experienced at 345 Smith Farm Road. The Army Corps of Engineers is currently reconstructing the leach field serving that unit.

3.2 FUEL-OIL STORAGE TANKS

A canopy affixed to the house a few feet above the above-ground 275-gallon fuel-storage tank located in the rear of each unit provides marginal protection from the elements. The tanks appear to have been coated with primer only and not to have been coated with an adequate protective finish. Frequently observed areas of rust on the fairly new tanks reinforce this perception. Moreover, a rupture and leakage of oil from a similar above-ground storage tank at another Connecticut military housing facility has been reported.⁸ Therefore, continued use of these tanks in their present condition may entail a significant environmental risk.

Potential risk to health might also attach to the collection of rainwater in the storage-tank containment box if the water is allowed to stagnate. On the other hand, if the occupant of a housing unit opens the containment-box drainage tap to release rainwater but forgets to close it, the effectiveness of the trough in containing an oil leak would be compromised should a tank rupture occur.

3.3 ASBESTOS-CONTAINING MATERIALS

Vinyl asbestos floor tiles were used in the original construction of the housing units. Asbestos insulation was also used on the water pipes in the utility rooms of the units. The floor tiles were observed to be in good condition. Water-pipe insulation materials, however, have deteriorated.

4 KNOWN AND SUSPECTED RELEASES

There have been no known major releases or impacts to the environment from the Orange housing facility. No hazardous wastes or hazardous materials are stored on-site. The recent septic system problems experienced by two of the units at this site represent a recurring health risk to the occupants. The releases of biodegradable human wastes would not have a long-term impact with respect to soil contamination, but, since the property has such a high water table, contamination of groundwater could pose an immediate health hazard. The septic systems are constructed too close to the water table and do not meet current State of Connecticut standards.

No releases are known or suspected from the abandoned underground storage tanks. Above-ground tanks are not adequately protected against corrosion, but are not known to have released contaminants.

Asbestos insulation on water pipes is deteriorated and may be a potential source of airborne asbestos.

5 PRELIMINARY ASSESSMENT CONCLUSIONS

Although these housing units were originally developed in support of a Nike missile battery located in Orange, no wastes associated with the operation or maintenance of the battery were delivered to or managed at this property. Furthermore, the housing facility was completely independent of the battery's launch and fire control operations with respect to water, sewer, and electrical utilities. No documentary evidence was found of utility connections between the housing site and the other battery properties.

Despite its independence from Nike battery operations, this property could adversely affect the environment because of the on-site waste disposal systems. Adverse effects could result if these systems remain in service without the modifications required to meet State of Connecticut standards, especially in light of the problems with surface-water drainage on the property.

The Area Facilities Engineer confirms that asbestos insulation generally is present on water-heater pipes in the utility rooms of the housing units. Such insulation was observed to be in disrepair, but there has been no documentation of the presence of airborne asbestos. Vinyl asbestos floor tiles were used in the original construction of the housing units.⁵ However, these tiles were observed to be in good condition.

Although the above-ground fuel-oil storage tanks are less than two years old, adverse environmental impacts can be anticipated if the tanks are allowed to remain in service in their present condition. It should also be recognized that the concrete containment box beneath each storage tank would be rendered ineffective if the drainage tap of the box were to remain open for an extended period of time.

There is no documentation of releases from the tanks abandoned in place. The method of tank abandonment is considered to be generally acceptable.

6 RECOMMENDATIONS

The Orange housing facility presents no imminent or substantial threat to human health or the environment. There is no evidence to suggest that hazardous or toxic constituents have ever been released from this property. No immediate remedial actions, therefore, are warranted for the site. Nevertheless, three potential environmental impacts from this property have been identified and these ultimately could warrant remedial action.

The 20 putatively substandard waste-disposal systems represent a continuing potential for environmental impact and a possible impediment to the expeditious excessing of this property. It is therefore recommended that a determination be made of the adequacy of the waste-disposal systems and that whatever modifications deemed necessary to meet State of Connecticut standards be made.

A second potential environmental impact derives from the continued use of the inadequately protected above-ground fuel-oil storage tanks and their associated concrete containment boxes. The integrity of these relatively new storage tanks should be confirmed, and following treatment for existing rust, protective coatings should be applied to the exteriors of the tanks. With respect to containment-box drainage taps, a method should be devised to ensure that they do not remain in the open position for extended periods of time.

A third potential environmental impact involves the possible health hazard from asbestos in the housing units. It is recommended that all deteriorated asbestos-containing materials in these housing units be remediated.

These recommendations assume that this property will most likely continue to be used for residential housing.

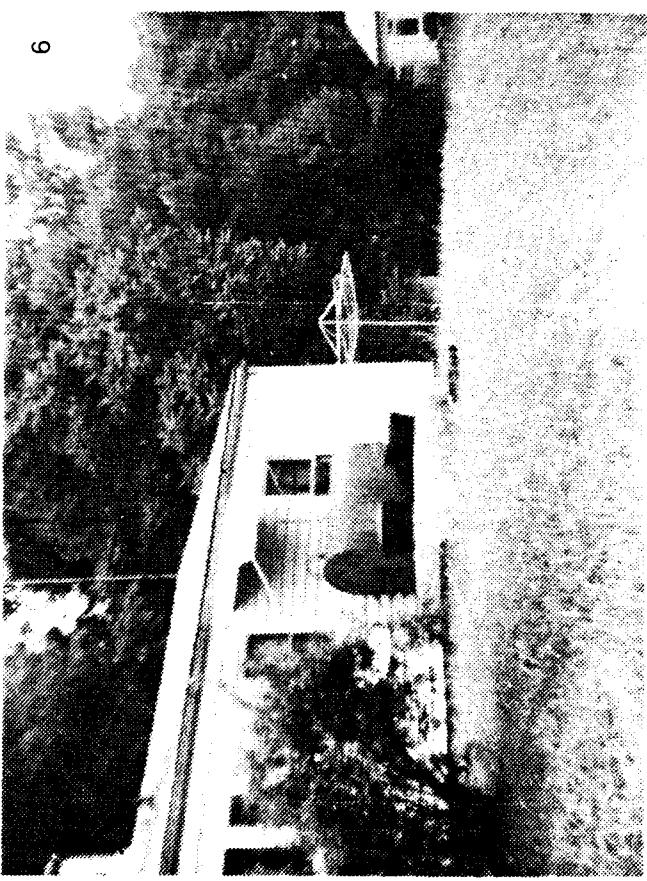
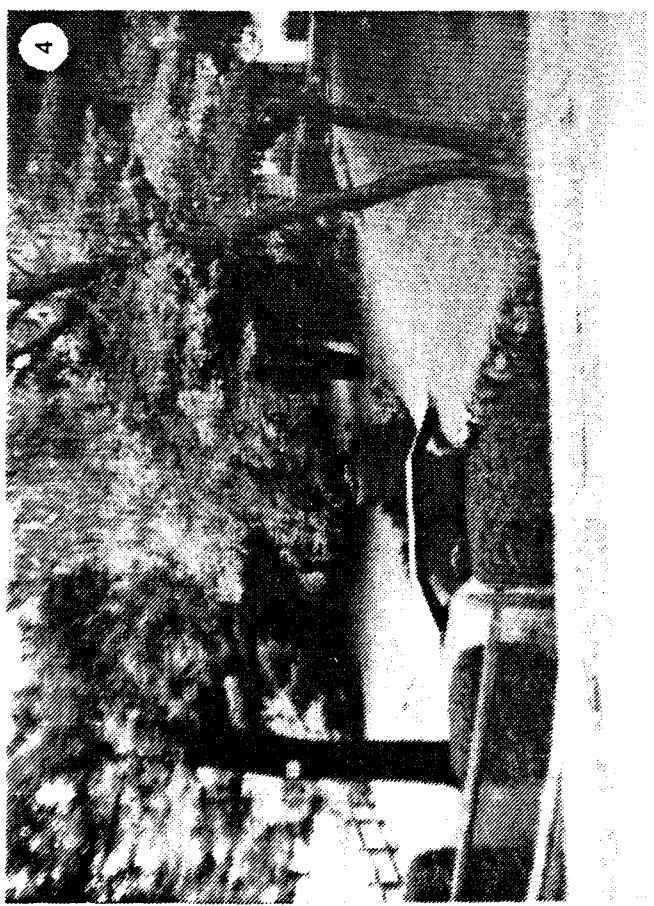
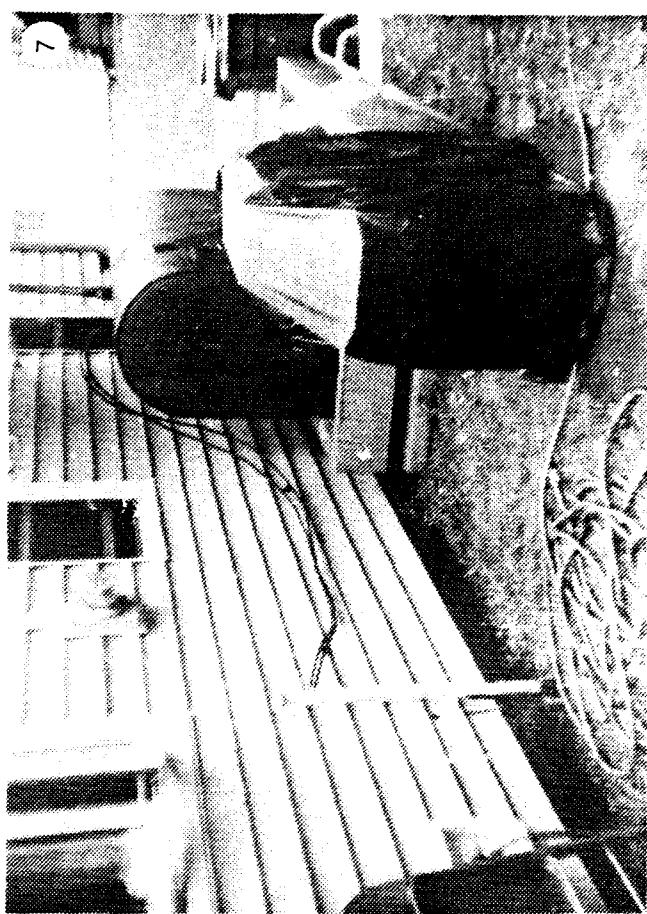
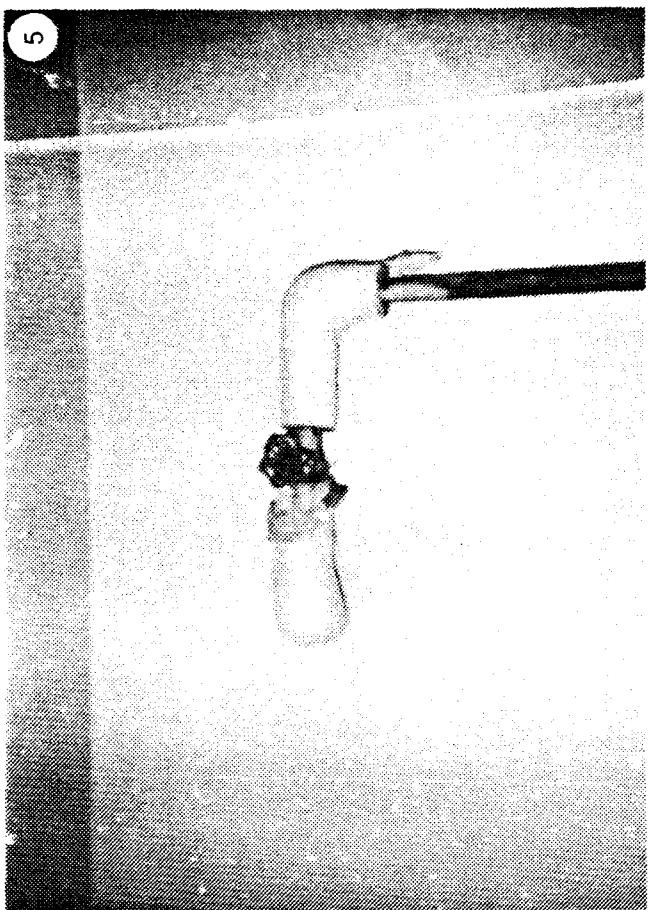
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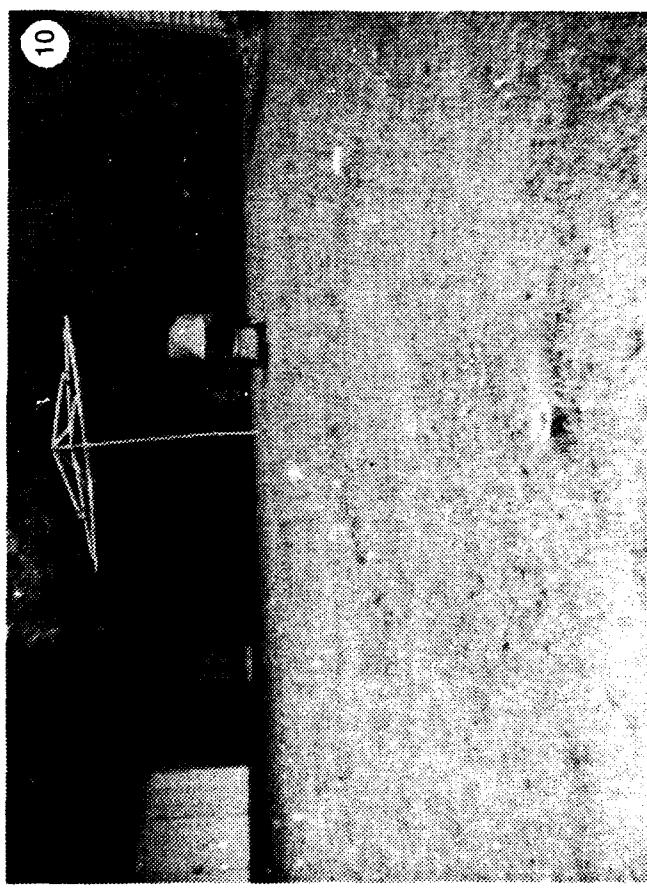
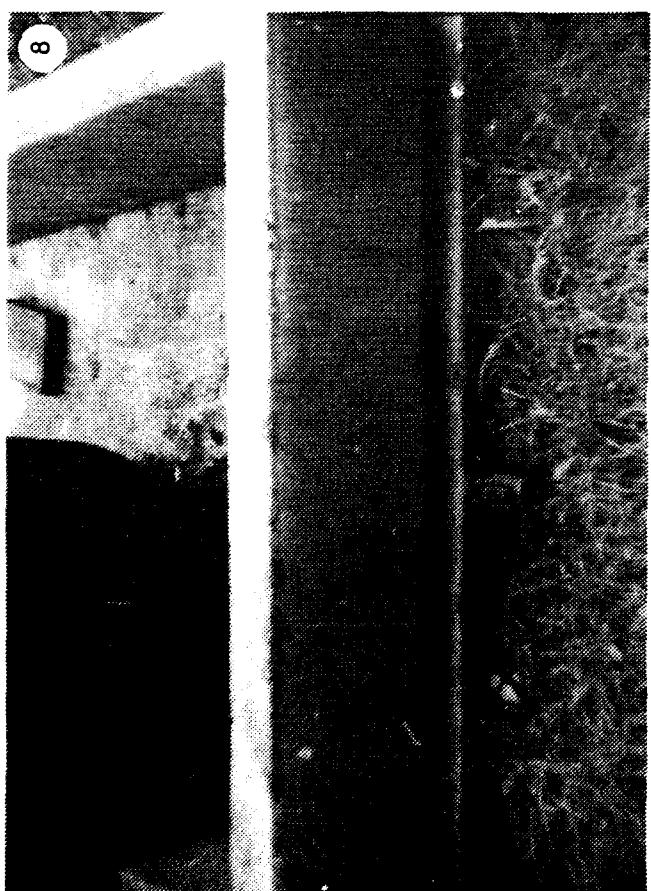
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APPENDIX:

**PHOTOGRAPHS OF ORANGE HOUSING FACILITY
AND SURROUNDING LAND**









IDENTIFICATIONS OF PHOTOGRAPHS

1. A view along Smith Farm Road from its intersection with Sybil Street; at top of road a barrier bars access to the site from Diana Road, which crosses Smith Farm Road beyond the barrier.
2. A westerly view along Diana Road; road barrier in foreground bars access to Sybil Street and the housing area.
3. A view along Sybil Street.
4. The brook that runs parallel to Sybil Street, along the southeast border of the housing area.
5. Hot water pipe insulation, in a state of disrepair, at one of the housing units.
6. Above-ground fuel-oil storage tank, concrete containment box, and overhead canopy in the rear of one of the housing units.
7. A closer view of the fuel-oil storage tank in photograph 6; the end seam of the tank shows considerable rusting.
8. The drainage tap of the concrete containment box; oil leaks from the tank would not be contained were this tap to be left in the open position.
9. An in-ground, 15-gallon container for waste disposal; these are no longer in use.
10. Several capped pipes associated with the septic system protrude a few inches above ground, at the rear of unit #362 on Sybil Street.
11. The round concrete cover of a septic system holding tank in the rear of unit #345, Sybil Street; this unit is no longer occupied because attempts to correct septic system problems were unsuccessful.
12. Sludge in the sewer system holding tank of unit #345.